

Letters to the Editor.

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River Terraces of the Euphrates.

IN NATURE (vol. III, p. 332, 1923) attention was directed to the remarkable uniformity in height of the successive terraces bordering the rivers which open into the Mediterranean Sea and the Atlantic Ocean. We now learn from Dr. E. Passemard (C.R., t. 183, p. 365, 1926) that this uniformity extends beyond these regions into the valley of the Euphrates, which opens through the Persian Gulf into the Indian Ocean.

Five well-marked terraces are well displayed one above the other on the right bank of the river along the great curve which it makes in passing from Rakka to Deir-el-Zor. Their heights above the river, as measured by M. Darrous, Topographer to the "Mission hydrographique Héraud," are given in metres in column 1 below :

	I.	2.
5th Terrace	77.13	93-95
4th "	56.14	55-57
3rd "	30.52	28-30
2nd "	15.36	15-16
1st "	3.60	...

A comparison of these with those of the terraces of the Isser, Algeria, measured by General Lamothe (col. 2), reveals a remarkable correspondence between the 2nd, 3rd, and 4th terraces of the two rivers : but this agreement does not extend to the 5th terrace. The 1st terrace was not observed on the Isser, but it exists at about the same height elsewhere in the Atlantic region.

The interest of these observations is increased by the discovery in the 3rd terrace of an implement which is assigned by Dr. Passemard to the upper Chellean industry.

University Museum,
Oxford.

W. J. SOLLAS.

The Transmission of Cutaneous Leishmaniasis to Man from Artificially Infected *Phlebotomus papatasi*.

THREE examples of the transmission of cutaneous Leishmaniasis to man from naturally infected sandflies, *P. papatasi* ♀♀, have been recorded by us (*Ann. Trop. Med. and Parasitol.*, vol. 20, No. 2). It was also shown that the causative organism in each of the three lesions was biologically and morphologically identical with *Leishmania tropica*. There could therefore remain no doubt as to *P. papatasi* being a transmitter of *Leishmania tropica*.

Nevertheless, inoculation experiments performed in 1925 on seven volunteers, with flagellates from sandflies artificially infected by feeding on oriental sores, all proved negative. In these experiments flagellates were obtained from sandflies 2, 4, 5, 6, and 7 days after the infecting feed. Since *P. papatasi* is a proved carrier of *L. tropica*, it was possible to account for these negative results only on the theory that *L. tropica* undergoes a complete biological cycle of development in the sandfly, and until the cycle is completed all the flagellates (and *Leishmania* forms) in the sandfly are non-infective.

In order to determine at what stage *L. tropica* in the sandfly becomes infective, a further series of experiments was performed with flagellates from artificially infected, laboratory-bred sandflies 8, 9, 10, 11, 12, 13, 14, 15, and 21 days after the infecting feed. All the sandflies were kept at laboratory temperature, 19°-23° C. The infecting feeds were made on a lesion which was the result of an artificial infection with flagellates from a natural infected sandfly. Up to the present two experiments have given positive results.

(1) *P. papatasi* ♀ hatched in laboratory, Sept. 8, 1926; fed on experimental lesion same date; died on Sept. 16, and dissected soon after death. (No further feed was allowed after the infecting feed.) Numerous flagellates were found in the pharynx, oesophagus, and mid-gut of the sandfly, but none in the hind-gut. Two inoculations were made into the left forearm of a volunteer shortly after the dissection.

Oct. 14, 1926. A papule noted on the site of one of the inoculated points was found to contain numerous Leishman-Donovan bodies.

(2) *P. papatasi* ♀ hatched in laboratory, Sept. 7, 1926; fed on experimental lesion, Sept. 9; died Sept. 17, and dissected shortly after death. (No further feed was allowed after the infecting feed.) Numerous flagellates were found in the whole alimentary tract from pharynx to rectum. Two inoculations were made into the left forearm of a volunteer shortly after the dissection.

Oct. 14, 1926. A papule on the site of one of the inoculated points was found to contain Leishman-Donovan bodies.

Thus a strain of *L. tropica* has been observed between June 26, 1925, and Oct. 14, 1926, through four successive generations of hosts.

- (1) A sandfly (naturally infected).
- (2) A human being experimentally infected from (1).
- (3) Laboratory-bred sandflies infected from (2).
- (4) Human beings infected from (3).

The proof that *Phlebotomus papatasi* is a transmitter of cutaneous Leishmaniasis is therefore complete.

S. ADLER.

O. THEODOR.

Microbiological Institute,
Hebrew University,
Jerusalem, October 15.

Science and Psychical Research.

IN reply to Dr. Tillyard's letter in NATURE of October 23, I cannot see that 'catalytic agent' is in any way a better simile for a medium than is the word 'instrument,' for catalysts, equally with instruments, are not possessed of any form of consciousness or of motives. Moreover, how can we be sure, as Dr. Tillyard states, that a medium is not actively a participant in the experiment? Trances can be simulated, and anyway, what is to prevent the sub-conscious mind being affected by motives, just as may be the case in the fully conscious mind?

The occasional failure of experiments in chemistry classes, as also, let me add, in the case of physics demonstrations, have no analogy to the uncertainty that seems to exist in all psychic affairs. As Dr. Tillyard must well know, no new fact in chemical or physical science is ever finally accepted until the experiments that establish it have been repeated by numerous observers, and further, until observers are satisfied that the experiments can be repeated with certainty at will, and give identical results under the same conditions every time.

Where do we get such exactness in psychical re-

search? Mr. W. H. Massey, the well-known engineer, tells me that he once offered a reward of 1000*l.*, which he advertised in the papers, to any one who could give a single conclusive demonstration of telepathy. In reply he did not get one single offer, and was told by an eminent authority on the subject that it was absurd to expect that telepathy could be done to order, and that it only occurred apparently spontaneously and on rare occasions. What sane scientific man would believe in any physical phenomenon which, once experimentally obtained, could not be reproduced at will and with certainty; and why should we treat psychical phenomena upon any different basis?

Dr. Tillyard objects to my strictures on the word 'national' as applied to a psychical research laboratory, which is so new that it has not yet even got into the London Directory. No doubt there are hundreds of concerns calling themselves 'national.' Some are really national institutions, and others assume this position. Most are merely commercial concerns, in many cases insignificant ones, wishing to advertise their commodities and give themselves a name by which they hope to magnify their small importance. Thus, I find that 'national' is even adopted by a firm of funeral undertakers. It is the same spirit that leads caravanserais that by no means deserve the appellation to call themselves 'Grand' or even 'Majestic.' When we come, however, to a new scientific institution the object of which is, I assume, the serious elucidation of truth, then I cannot think that it was a happy idea to begin this comparatively minor institution's career by calling it by a pretentious name to which it has no real claim, and may easily be confused by the ignorant with another really national laboratory of vast importance.

I have, however, no wish to labour this point, in regard to which Dr. Tillyard has attacked me. It was only a minor issue in my letter in *NATURE* of September 25, where the principal reason I gave for declining Dr. Tillyard's kind invitation was that, in my opinion, thermographic phenomena in connexion with mediums are more a matter for a physiologist than for a physicist.

Dr. Tillyard, however, broadly accuses me of "an unscientific attitude to the subject of psychical research." This he bases on his belief that I have never been to a spiritualistic—or shall we say psychical—séance, and never intend to go to one. I must defend myself against this charge; but here I must first differentiate between what, on one hand, I would call spiritualistic séances, where professional mediums are employed, and where spirits, either directly visible or through mediumistic agency are vocal or mechanically active, are supposed to be conjured up, and secondly, séances or meetings at which such things as telepathy are experimented with, where no mediums are requisite. Let me say at once that I have taken part in numerous serious meetings of the latter kind, where telepathy without contact was attempted, but have never met with even the slightest evidence of what could be called success. This, I may add, has been always to my exceeding disappointment, as was also the case when I tried most strenuously to repeat Blondlot's *N*-ray experiments. In both cases at first I fully expected to succeed, just as I did succeed when I repeated Röntgen's X-ray experiments when these were first announced, and before they had been confirmed by any one else in England.

As regards the other type of spiritualistic séances, I think I can honestly say that if I have in the past never attended such, this is for the reason that I have never been invited to attend one, as I am sure, in the days when I delighted in Maskeleyne and Cook's

Egyptian Hall of Mysteries, and also enjoyed wonderful thought-reading exhibitions by Stuart Cumberland and others, I should have jumped at such an invitation. As regards the present and the future, however, perhaps increasing age and experience have given me a greater sense of responsibility, and my present attitude is that I do not think it right to give any countenance to proceedings where I should fully expect to be misled, and afterwards told that, anyway, I could not explain the phenomena I had been shown, and that therefore there must be something supernatural in them.

My firm conviction is that, as in the past, so at present, there is overwhelming evidence that at all spiritualistic séances where there are ghostly apparitions, spirit voices, and any kind of communication with what is supposed to be another world, the phenomena are invariably due to fraud—not necessarily conscious, perhaps in some cases subconscious, but absolute fraud all the same. I have already been taken to task for the use of this ugly word 'fraud' in this particular connexion, but I get it from no less a master in science than Lord Kelvin, who used frequently to say that all the phenomena of what he called that 'wretched superstition of spiritualism,' when not to be explained by 'defective observation,' were due to 'fraud.' If it is considered an unscientific attitude to refuse to have any dealings with fraud, then I prefer to be thought unscientific, for I agree with the book of Ecclesiasticus that "He that toucheth pitch shall be defiled therewith."

In conclusion, let it not be supposed that I impute anything worse than undue credulity to our very few really eminent scientific spiritualistic believers, past and present, who I am sure were or are quite honest in what they thought or think to be their pursuit of truth. Of these I would only repeat the words of my countryman, David Hume, who, speaking of miracles more than one hundred years ago, asked the simple question as to whether it was more probable that these very extraordinary and unprecedented things did actually happen, or whether the observers or narrators of them were mistaken.

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October 27.

ONE wonders who are the onlookers who would be so 'unwise' as to elevate any of the three 'hypotheses' mentioned by Sir Oliver Lodge (*NATURE*, October 30, p. 622) to the "high status required of a scientific theory." Few would dignify even by the term hypothesis what are simply observations. Granted genuine phenomena, how much further are we scientifically? Granted 'ectoplasm,' can science justify repetitions of the human vivisection necessary to produce it when there is no purpose, except curiosity, in view? Granted an 'intelligence' behind the phenomena, can science say to which order amongst the myriad intelligences of Nature such belongs? Granted a 'spirit' hypothesis, can science describe or define spirit?

If the function of science be to discover the *rationale* of all facts of human experience, it follows that it can serve and protect mankind only in so far as it discharges this function. None of the many eminent men of science in European countries and the U.S.A. who, during the last seventy-five years, have attested the reality of psychic phenomena, have advanced a scientific theory of the cause. If present-day investigators would make themselves acquainted with what has been done by their predecessors (who were equally competent and disinterested), they would